

Open Reduction and K-Wire Fixation of Lateral Humeral Condyle Fractures in Children.

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ABSTRACT

BACKGROUND: Lateral condylar humerus fractures are the second most common pediatric distal humerus fractures. Open reduction and internal fixation is recommended for fractures displaced by more than 2 mm. The aim of this study was to present the short term clinical and radiological results of patients with a displaced lateral humeral condyle fracture treated with ORIF with K-Wires in a tertiary care hospital of Kashmir.

METHODS A prospective study of patients treated for displaced paediatric lateral humeral condyle fracture in our Hospital was done between July 2018 and July 2022. 25 patients with a displaced paediatric lateral humeral condyle fracture were included in the study, 17 males and 8 females. The age of the patients ranged between 3 and 13 years, with a mean of 6.2 years. The mean time to radiological union and therefore removal of the wires was 33 days (4.7 weeks). All the K-wires were removed in the outpatient department.

CONCLUSION Our results demonstrate that fracture union and excellent final outcomes can be expected in patients with a displaced fracture managed by ORIF with K-wire fixation, with the wires only being removed after there is evidence of radiological union. Physiotherapy as soon as possible after the immobilisation period is important as it has been shown to be related with fewer complications, fewer residual symptoms and faster gains in range of motion and strength

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I. INTRODUCTION

Lateral condylar humerus fractures are the second most common distal humeral fracture in children, accounting for approximately 17% of pediatric distal humerus fractures, occurring at an average age of 6 years old¹. The fractures are usually unstable and tend to displace as a

result of activities of the hands and wrists because the lateral condyle is the origin of common extensor, which may lead to nonunion and cubitus valgus deformity of the elbow joint if treated improperly². The diagnosis can be difficult both radiologically and clinically, with loss of function occurring, due to extension into the articular surface. The result of an incorrectly treated lateral condylar physeal injury may not be evident until months or years after the initial injury³. The Milch classification is widely used, and they are; type I and type II according to whether the fracture exited through the capitellar–trochlear groove or through the trochlear, respectively⁴. Cotton noted that the fragment was commonly displaced outward and backwards⁵. The Jacob classification dictates whether surgical intervention is required. A Jacob I is non-displaced, II is displaced by 2 mm, but not malrotated. Type III is displacement with malrotation⁶. The aim of lateral humeral condyle fracture treatment is to ensure healing of the fracture and to prevent pseudoarthrosis, malunion, deformities and functional disorders³. Traditionally, undisplaced stable fractures were treated in cast immobilisation with observation. Articular fractures that have a hinge may be treated with closed reduction and percutaneous pinning.

Fractures that are unstable, malrotated and displaced by over 2 mm usually undergo open reduction internal fixation usually with wires, smooth pins or screws^{7,8}.

The aim of this study was to present the short term clinical and radiological results of patients with a displaced lateral humeral condyle fracture treated with ORIF with K-Wires in a tertiary care hospital of Kashmir.

II. MATERIALS AND METHODS

A prospective study of 25 patients treated for displaced paediatric lateral humeral condyle fracture was done in Bone and Joint Hospital an associated hospital of GMC Srinagar between July 2018 and July 2022.

The inclusion criteria were as follows: age below 14 years; closed fractures; fresh lateral condylar humerus fractures; displacement of fragments exceeding 2 mm; or unstable fractures with less than 2mm displacement. The exclusion criteria were as follows: age above 13 years; open fractures; old fractures; and stable fractures or fractures with displacement less than 2 mm.

SURGICAL TECHNIQUE

The patients lay on the operating table in a supine position with the affected arm abducted. A single dose of intravenous prophylactic antibiotics was administered at the anaesthetic induction. After induction of general anesthesia, a tourniquet was applied followed by skin preparation and draping.

The fracture was identified and reduced via a lateral approach to the distal humerus, through the interval between brachioradialis and triceps. The joint surface was anatomically reduced with minimal dissection of soft tissues in order to reduce the risk of avascular necrosis of the capitellum. The fracture was stabilised with two K-wires that were left outside the skin and an above elbow POP slab was given in 50 degrees of flexion.

Patients were followed up weekly until radiological union of the fracture was , and thereafter, the wires and the POP were removed in the outpatient department. Following the removal of plaster, all patients were subjected to physiotherapy focusing on elbow full range of motion, mainly with active movement exercises and followed again at 2 weekly intervals upto 10-12 weeks from surgery.

At the final follow-up of 1 Year from surgery, outcome was assessed clinically for ROM and deformity and radiologically. Also, the patients were asked about any residual pain and whether or not they were happy performing daily life activities and sports.



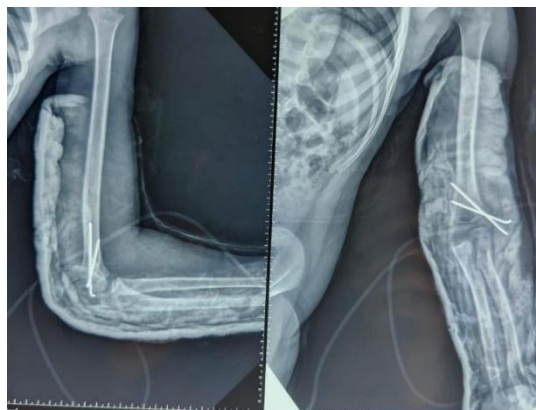


FIGURE1:ORIF OF DISPLACED HUMERAL LATERAL CONDYLE FRACTURE WITH K-WIRES.

III. Results

25 patients with a displaced paediatric lateral humeral condyle fracture were included in the study, 17 males and 8 females. The age of the patients ranged between 3 and 13 years, with a mean of 6.2 years. All included cases were the result of low-energy closed injuries. In relation to the Milch's classification, 5 fractures were classified as Milch I and 20 as Milch II.

The mean time to radiological union and therefore removal of the wires was 33 days (4.7 weeks). All the K-wires were removed in the outpatient department.

Two patients had superficial infection around the K-wires, which responded well with oral antibiotics. The majority of the fractures demonstrated radiological union between 4 and 6 weeks with the exception of one patient with a Jacob III fracture who reached 8 weeks.

None of the patients in this series developed a non-union or a malunion.

Hypertrophy of the lateral condyle occurred in 11 cases (42 %). As a result of lateral spurring, 1 patient developed a pseudocubitusvarus deformity. In all cases of lateral spurring, there was no pain or interference with daily activities, and sports and no corrective intervention was required. None of the patients developed a fishtail deformity.



FIGURE 2:FRACTURE THAT HEALED WITH LATERAL HYPERTROPHY

IV. Discussion

The results of this study demonstrate that open reduction and K-wire fixation of displaced (2 mm) lateral humeral condyle fractures leads to acceptable short term clinical and radiological results without any significant complications. The necessity of reduction and stabilisation of displaced and/or rotated lateral condyle fractures has been well established in the literature^{3,9}. There are, however, a number of studies suggesting

ORIF might be unnecessary in many cases and that it might even lead to avascular necrosis as a result of extensive soft tissue dissection¹⁰. Song et al.⁸ prospectively looked at 63 patients with lateral condyle

fractures of the humerus. They attempted closed reduction internal fixation using K-wires in all of them, but in 13 cases ORIF was required. Their success rate for fixation was 73 % with no cases of non-union or malunion. They suggested that CRIF often results in effective treatment for displaced lateral condyle fractures. However, in their study, only 3 of the 6 patients with a Jacob III fracture were managed with closed reduction⁸.

In our study, we presented 25 cases of lateral humeral condyle fractures treated successfully with ORIF with only one case of delayed union and no cases of avascular necrosis. We therefore advocate for ORIF in all displaced lateral condyle fracture as our results demonstrated union and good functional outcome at short term in all patients with no significant complications.

In our study, all the K-wires were left exposed. It has been suggested that leaving the wires exposed could increase the risk of infection with reported incidences varying from 1 to 28 %⁷. In this study leaving the wires exposed gave the advantage of wire removal in the outpatient department instead of administering a further general anaesthetic to the patient. Furthermore, from our series, only 2 cases out of 25 developed a superficial infection around the K-wires, which was successfully treated with oral antibiotics. There were no cases of deep infection. Our results were similar to the study by Das De et al.⁸, which advocates for leaving the wires exposed following ORIF of a lateral condyle fracture.

In our series, 11 cases (42 %) of the patients developed lateral spurring. Similar incidence of lateral spurring (40 %) was reported in the study by Thomas et al.⁹ As a sequela of lateral spurring, 1 of our patients developed a pseudocubitusvarus deformity at the elbow. Although the patients were able to feel the spur, it was pain free and did not affect their range of movements nor interfered with their daily activities and sports, which is in accordance to the published literature^{9,11}.

V. Conclusion

Our results demonstrate that fracture union and excellent final outcomes can be expected in patients with a displaced fracture managed by ORIF with K-wire fixation, with the wires only being removed after there is evidence of radiological union. Physiotherapy as soon as possible after the immobilisation period is important as it has been shown to be related with fewer complications, fewer residual symptoms and faster gains in range of motion and strength.¹²

Bibliography

- [1]. Flynn JM, Skaggs DL, Waters PM. Rockwood and Wilkins' fractures in children. Philadelphia: Lippincott Williams & Wilkins; 2014.
- [2]. Flynn JC. Nonunion of slightly displaced fractures of the lateral humeral condyle in children: an update. *J PediatrOrthop*. 1989;9(6):691–6.
- [3]. Rockwood CA, Wilkins KE, Beaty JH, Kasser JR (2006) Rockwood and Wilkins' fractures in children, 6th edn. Lippincott Williams & Wilkins, Philadelphia, xv, p. 1200.
- [4]. Milch H (1964) Fractures and fracture dislocations of the humeral condyles. *J Trauma* 4:592–607.
- [5]. Cotton FJ (1902) IX Elbow fractures in children. Fractures of the lower end of the humerus; lesions and end results, and their bearing upon treatment. *Ann Surg* 35(3):365–399.
- [6]. Jakob R, Fowles JV, Rang M, Kassab MT (1975) Observations concerning fractures of the lateral humeral condyle in children. *J Bone Joint Surg Br* 57(4):430–436.
- [7]. Das De S, Bae DS, Waters PM (2012) Displaced humeral lateral condyle fractures in children: should we bury the pins? *J PediatrOrthop* 32(6):573–578
- [8]. Song KS, Kang CH, Min BW, Bae KC, Cho CH, Lee JH (2008) Closed reduction and internal fixation of displaced unstable lateral condylar fractures of the humerus in children. *J Bone Joint Surg Am* 90(12):2673–2681
- [9]. Song KS, Waters PM (2012) Lateral condylar humerusfractures:which ones should we fix? *J PediatrOrthop* 32(Suppl 1):S5–S9
- [10]. Thomas DP, Howard AW, Cole WG, Hedden DM (2001) Three weeks of Kirschner wire fixation for displaced lateral condylar fractures of the humerus in children. *J PediatrOrthop* 21(5):565–569
- [11]. Pribaz JR, Bernthal NM, Wong TC, Silva M (2012) Lateral spurring (overgrowth) after pediatric lateral condyle fractures.*JPediatrOrthop* 32(5):456–460
- [13]. Cincinnati Children's Hospital Medical Centre (2007) Evidencebased guideline for loss of elbow motion following surgery or trauma in children aged 4–18. *Cincinnati Child Hosp Med Cent*21(9):1–9

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